JC08 Rec'd PCT/PTO 07 MAR 2001

FORM PTO-1390 (Modified) (REV 11-98) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR
RBL0072	09/786646

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE99/02843	08 September 1999 (08/09/99)	10 September 1998 (10/09/98)

TITLE OF INVENTION

METHOD FOR THE OPTIMIZED TRANSMISSION OF MULTIMEDIA SERVICES VIA MOBILE COMMUNICATIONS NETWORKS (MOBILE TELEPHONENETWORKS)

APPLICANT(S) FOR DO/EO/US

KELLER, Walter

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☒ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

Check No. 051247

U.S. APPLICATION NO (IF KNOWN, SEE 37 CFR	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/786646	PCT/DE99/02843	RBL0072

21. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1,000.00**	
☒	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but Internation Search Report prepared by the EPO or JPO **$860.00**	
☐	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710.00**	
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**	
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**	

ENTER APPROPRIATE BASIC FEE AMOUNT =	**$860.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	20 - 20 =	0	x $18.00	**$0.00**	
Independent claims	1 - 3 =	0	x $80.00	**$0.00**	
Multiple Dependent Claims **(check if applicable).**			☐	**$0.00**	
TOTAL OF ABOVE CALCULATIONS =				**$860.00**	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) **(check if applicable).** ☐				**$0.00**	
SUBTOTAL =				**$860.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +				**$0.00**	
TOTAL NATIONAL FEE =				**$860.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☐				**$0.00**	
TOTAL FEES ENCLOSED =				**$860.00**	
				Amount to be: refunded	$
				charged	$

☒ A check in the amount of **$860.00** to cover the above fees is enclosed.

☐ Please charge my Deposit Account No. in the amount of to cover the above fees.
A duplicate copy of this sheet is enclosed.

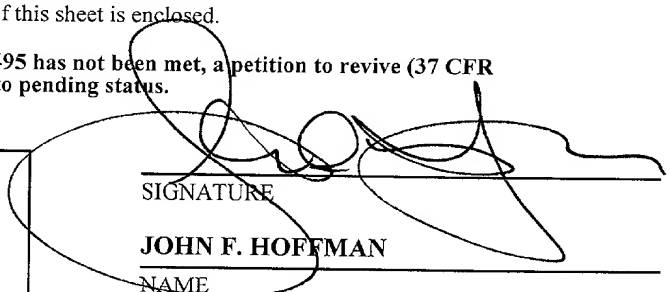
☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **02-0385** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

John F. Hoffman
BAKER & DANIELS
111 East Wayne Street, Suite 800
Fort Wayne, Indiana 46802

TX: (219) 424-8000
FAX: (219) 460-1700



SIGNATURE

JOHN F. HOFFMAN
NAME

26,280
REGISTRATION NUMBER

March 7, 2001
DATE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of Walter Keller Serial No. Filed: Title: METHOD FOR THE OPTIMIZED TRANSMISSION OF MULTIMEDIA SERVICES VIA MOBILE COMMUNICATIONS NETWORKS (MOBILE TELEPHONE NETWORKS)	)	Group: Examiner:

PRELIMINARY AMENDMENT DELETING MULTIPLE DEPENDENT CLAIMS

Assistant Commissioner of Patents
Washington, DC 20231

Sir:

Prior to calculating the filing fee, please enter the following amendments to the application.

IN THE CLAIMS

In claim 3, line 1, delete "or 2".

In claim 4, line 1, delete "or 2".

In claim 5, line 1, delete "claims 1 to 4" and substitute therefor --claim 1--.

In claim 6, line 1, delete "claims 1 to 5" and substitute therefor --claim 1--.

In claim 7, line 1, delete "claims 1 to 6" and substitute therefor --claim 1--.

In claim 8, line 1, delete "claims 1 to 7" and substitute therefor --claim 1--.

In claim 9, line 1, delete "claims 1 to 8" and substitute therefor --claim 1--.

In claim 10, line 1, delete "claims 1 to 9" and substitute therefor --claim 1--.

In claim 11, line 1, delete "claims 1 to 10" and substitute therefor --claim 1--.

In claim 12, line 1, delete "claims 1 to 11" and substitute therefor --claim 1--.

Please add the following new claims:

--13. A method according to claim 2, characterized by having the data stream that was separated according to data structure re-assembled after the optimized parallel transmission into the original data stream such that the optimization process covered by this invention is transparent to the user.

14. A method according to claim 2, characterized by having the option that at least some application-specific components of the data stream are not aggregated completely, but may be further transmitted at least in part as a separate data stream and may be transmitted on an optional basis within the mobile network or alternatively via various network accesses to other telecommunications or data networks to other receivers or, depending on the application, to the same receiver (single or multiple connection).

15. A method according to claim 2, characterized by having a functional unit (CAC) on the user's side as well as a function unit (ICAMU) on the side of the core network, which are designed in their protocol, conversion, and algorithm-specific components preferably as software modules for microprocessors or signal processors in such a way that an update of partial

functions as needed or alternatively the complete function via the mobile radio communications network is possible, which thus allows for a permanent method for updating to new methods and protocols.

16. A method according to claim 3, characterized by having a functional unit (CAC) on the user's side as well as a function unit (ICAMU) on the side of the core network, which are designed in their protocol, conversion, and algorithm-specific components preferably as software modules for microprocessors or signal processors in such a way that an update of partial functions as needed or alternatively the complete function via the mobile radio communications network is possible, which thus allows for a permanent method for updating to new methods and protocols.

17. A method according to claim 4, characterized by having a functional unit (CAC) on the user's side as well as a function unit (ICAMU) on the side of the core network, which are designed in their protocol, conversion, and algorithm-specific components preferably as software modules for microprocessors or signal processors in such a way that an update of partial functions as needed or alternatively the complete function via the mobile radio communications network is possible, which thus allows for a permanent method for updating to new methods and protocols.

18. A method according to claim 2, characterized by having an optional connection between the network functional unit (ICAMU) and the Customer Care and Billing System (CCBS) of the network operator for the billing of offered services and the creation and verification of the use of the methods covered by the invention by a single user.

19. A method according to claim 3, characterized by having an optional connection between the network functional unit (ICAMU) and the Customer Care and Billing System (CCBS) of the network operator for the billing of offered services and the creation and verification of the use of the methods covered by the invention by a single user.

20. A method according to claim 4, characterized by having an optional connection between the network functional unit (ICAMU) and the Customer Care and Billing System (CCBS) of the network operator for the billing of offered services and the creation and verification of the use of the methods covered by the invention by a single user.--

Respectfully submitted,

John F. Hoffman
Registration No.26,280

Attorney for Applicant

JFH/pmp/#170707

BAKER & DANIELS
111 East Wayne Street, Suite 800
Fort Wayne, IN 46802

Date: March 7, 2001

09/786646
JC02 Rec'd PCT/PTO 07 MAR 2001

Method for the Optimized Transmission of Multimedia Services via Mobile Communications Networks (Mobile Telephone Networks)

Description

[0001] The invention relates to a method for the optimized transmission of multimedia services in mobile communications networks as defined by patent claim 1.

[0002] Multimedia services are defined within the framework of the present invention as the user-oriented operation and the electronic transmission of any applications selected or combined by the user, such as voice, picture or data. This definition refers to the user (the beneficiary). The technology used by the user is not relevant here. However, the literature often uses the term multimedia in combination with a specific transmission method, a protocol or a specific technology. Consequently, various interest groups have diverse parallel undertakings in regard to standardization.

[0003] The Internet is based on the routing protocol TCP/IP (Ipv4) of the Internet Engineering Task Force (IETF). There are numerous competing processes (WWW, FTP, chat, e-mail, etc.) for the various uses. The standardization is done primarily by multinational software producers and universities, which leads to numerous derivatives, incompatibilities, and company standards. The knowledgeable user can obtain the most current compatibility of his installation (at least in the data processing/PC area) by implementing the latest software releases in his installation.

[0004] However, the H.xxx standards (ETSI) are obligatory for videoconferencing in telecommunication networks (for example, H.320 for 64 kbit/s ISDN transmission). The connection set-up is done by the usual number dialing. The picture codecs (in the professional area) are normally integrated solutions (chips). The user does not have to be a data processing professional, the operability and quality are assured by the network. However, there is less room for flexibility for modifications than in the case of the Internet.

[0005] There are also video compression methods for digital video transfers, such as MPEG (ETSI), which was developed particularly in regard to video transport, storage and PC based video processing. There are also many competing solutions on the application level. For example, the American producer SUN Microsystems facilitates the platform independent direct transfer of program code between internet server and client by the "Java Products" and thus the interactive operation of dynamic applications within the page description language HTML (Hypertext Markup Language) in the WWW, while Microsoft, another American producer, combines his own Internet browser with the functions of his own operating system (Microsoft Windows 98). Both methods can be augmented in principle for multimedia applications. There are also digital broadcast methods, such as DVB, DAB and video standards, such as DVD etc., which were developed and continue in development with varied historical backgrounds and differing main applications.

[0006] In principle, the protocol and transmission technology should not matter to the user in his multimedia application. In each case, an appropriate technical apparatus must operate the various applications and collect the data streams, the source and canal coding as well as provide for protocol processing and the data security at the various interfaces to the chosen communications network. On this basis, the user should obtain the same result regardless of which of the various standards is chosen.

[0007] If it is assumed that the "normal" user will normally use a telecommunications network with relatively small bandwidth for his multimedia applications for economic reasons, the limited transmission bandwidth will usually generate various quality problems, with variations among processes. These problems will also not disappear in the future. For reasons of economy, it is not possible to give users of fixed networks a choice of alternative bandwidths with their corresponding transmission infrastructures, which would be used on the average only for very short periods. The same applies for mobile networks. Here it is the limited resource "frequency", which sets an additional economic limit.

[0008] The existing multimedia standards derive primarily from two differing application fields. On the one hand, the telecommunication industry and the network operators have dealt with video telephone and multimedia services for a long time. This derived from high data rates in the scientific field and had achieved a relatively acceptable quality with a data transmission rate of 64 kbit/s (circuit switched) for private uses with average demands. The quality problem is noted primarily on the side of the network providers. The customer expects better quality with the same transmission bandwidth, using his normal ISDN main connection.

[0009] On the other hand, there is an integration of multimedia services, such as telephone and video transmission in the Internet, with low quality levels at present. However, this is supposed to improve over time, particularly for the private user (see above). However, the expectations regarding quality are exactly reversed. When service is free, the user will accept a low level of quality. Operators and customers assume that the user can solve the quality problem with an improved telecommunication connection with an increased data transmission rate, and they rely on the cost reducing effects of the liberalization in the telecommunications market. This is even more likely when the user can see that the local area networks already in operation (with incomparably higher data rates) show that IP oriented uses can be handled with acceptable quality, if there is just sufficient bandwidth.

[0010] It remains to be seen where the future will lead. Both processing methods share a common characteristic. The definition of coding and transmission methods normally assumes fixed line connections with bit error rates less than 10^{-6}. However, the error rate at the air interface for mobile transmissions is normally larger than 10^{-3}. In order to achieve a comparable transmission quality at the air interface as for fixed lines, it is thus necessary to apply a significantly higher transmission effort for the preventive security of the transmission or optionally for the secure reconstruction of the transferred data, which may also vary significantly in technical respects among the alternative applications. For

example, the GSM network uses an integrated forward error correction FEC for voice traffic to transmit voice with maximum redundancy free of errors, whereas for data transmission, for example, the end-to-end check with repeated transmission of faulty data blocks is normal. Block repetition would lead to significant problems for voice or line-based video transmission, where data transmission with FEC would imply a significant waste of transmission capacity.

[0011] If all multimedia applications are jointly coded for mobile transmissions and are transmitted with a bit error rate less than 10^{-6}, then the higher error rate of the air interface in the mobile operation with the same gross channel capacity as in a comparable wire network leads to a significant reduction of the remaining net channel capacity.

[0012] For reasons of spectrum economy, mobile operations (GSM specifications) will therefore define various optimization processes (primarily coding, security and transmission processes) for the various application concentrations. The title "services" was defined and the network was optimized for voice, fax and a variety of various data services. This led to excellent quality for the individual services, however, it necessitated a long drawn-out process of standardization and implementation as well as to low acceptance by GSM customers (only in the high-price segment) due to inflexible technical interfaces and to incompatibilities with the fast-changing data processing world and to complicated application scenarios.

[0013] A new service, the General Packet Radio Service (GPRS), which relies on Internet protocol structures, will relax the situation for pure data applications within the GSM network, but it provides no solution for multimedia applications with voice and video information coded within the data stream. GPRS users share a limited number of transmission channels in Slated Aloha Random Access technology at the air interface, where a continuous data transfer rate cannot be guaranteed without consuming and expensive resource reservation. The advantage is that in the main area of use, the Internet, the user may define and use his own applications (his "services") independently of the network.

[0014] Future networks, such as the Universal Mobile Telecommunications System (UMTS) under discussion, will probably not include such a variety of transmission services, but will make application-specific transmission channels (voice, data synchronous, data asynchronous, IP, various bit rates etc.) available and will provide a wider bandwidth particularly for the IP mode. The secured operation of a specific application, including its quality criteria, is transferred more and more from the network to the terminals, where the network merely provides the means of transmission.

[0015] However, this does not change the basic problem of the quality of the air interface. Appropriate transmission methods of the entire multimedia stream may reduce the bit error rate at the air interface, and videos with smooth motion and understandable audio may be transferred by providing sufficient bandwidth and enough transmission channels, but this waste of resources is neither optimal nor commercially advisable for economic reasons compared to an application-based optimized transmission.

[0016] The present invention proposes a method to better realize an improved transmission of multimedia user-controlled applications within a mobile transmission network with the maximum achievable quality of the individual single applications (Quality of Service) and the simultaneous minimization of the required bandwidth in the air interface (spectrum economy).

[0017] This task is solved with the characteristics described in Patent Claim 1.

[0018] Because the fixed connection backbone networks have more bandwidth at their disposal than exists at the air interface, this method will result in an optimal use of frequencies as well as a significant quality increases, for example, relative to an integrated GPRS transmission of all multimedia data, which requires a significantly higher bandwidth.

[0019] A further advantage of this method derives from the parallel use of resources, which are optimized for the purpose and which are at least partially located at the air interface, and which can save substantial infrastructure expenditures with the corresponding long development and installation requirements compared to the general augmentation of all bandwidths (with the additional frequency problem). Use of the methods of this invention will make it possible to realize multimedia services substantially faster and at lower cost with a high quality level.

[0020] The dependent patent claims describe advantageous implementations and further developments of the invention.

[0021] The network operator also has the possibility to influence the dynamic usage optimization of his networks and thus generate additional savings in the infrastructure compared to general capacity increases of the various transmission channels, which must be dimensioned in each case for the expected peak communications loads during the peak hours of use.

[0022] The invention is illustrated using diagrams, which merely demonstrate a possible execution using the example of an enlarged GSM network in schematic form, where the drawings point out other uses and advantages of the invention.

[0023] Figure 3 shows the conventional procedure for voice and data transmission in the GSM network. Network access for voice and data is handled through the mobile terminal (MT), where the mobile telephone normally contains the required terminal adapter (TA) for connections with a data terminal (PC). The further connection to the base station (BTS, BSS) is handled via the air interface. This connection transfers the transfer protocols optimized for the service in question for the efficient use of the air interface. These protocols are converted in the transcoder and bit rate adapter unit (TRAU) into standardized ISDN protocols (64 kbit/s-A-low for voice; V.110 with bit rate adaptation for data). The mobile switching center (MSC) is therefore essentially identical to an ISDN switching center in the fixed network and it is in turn connected to the home

location register (HLR) to satisfy the mobile connection needs of the customers. The interworking is done by the interworking function (IWF) transparent to the ISDN network or by an analog modem to the PSTN network.

[0024] The future data transmission service GPRS is handled by a packet control unit (PCU) to the switching node (GSSN) and to the packet gateway (GGSN) to the Internet. These connections use the Internet protocol structure (IP).

[0025] The choice of transmission channel at the air interface depends uniquely on the service used, which also simultaneously defines the further connection of circuit-switched services via IWF or alternatively packet-switched services via GGSN. The selection of service depends on the services implemented in the network in the terminals. Multimedia applications may be handled in this example either by Internet access, where video, voice and data are jointly coded via GPRS, or alternatively via a circuit-switched data service (for example Bearer Service 25 with 9.6 kbit/s). Both cannot be optimal in any single instance. An IP connection to a private communication partner (Corporate Network) is done in this scenario either by the Internet detour or directly by circuit switching. A professional voice and data combination cannot be accomplished from within the application. Such a use is possible only via data transfer (see above) and via a parallel manual and an additional voice connection. The user must therefore decide at the beginning of a multimedia connection whether he will use the voice channel, a circuit-switched or a packet-switched data service for his entire application.

[0026] An additional service surrounding GSM is the High Speed Circuit Switched Data Mode (HSCSD). This service used several coupled transmission channels for data transfer and is therefore useful in principle for applications with wider bandwidth, such as streaming video transmissions. The use of the HSCSD mode for Internet access cannot be advised from a cost standpoint, because Internet applications require pulse transmissions for operation system reasons and will lead to significant overhead costs in circuit-switched systems. Likewise, the integrated operation of a voice connection in such a channel would be an irresponsible waste of resources. Consequently, market research to-date has shown very limited user acceptance for use of this service appropriate for an H. channel with its cost and resource structure of n x voice channels.

[0027] Figure 1 shows a potential realization of the method of this invention for the example of a GSM network.

[0028] The schematically depicted multimedia workplace (MW), which may be, for example, a notebook with a video camera and a hands free telephone, consists here essentially of the software application (APS), the application programming interface (API), the newly added channel access client (CAC; shown here as a component of the mobile terminal MT) and the terminal adapter (TA, here likewise shown with the MT) and the mobile terminal (MT). The latter is depicted here as a PC card, as an example. The physical shape of the MT may vary, whether as a cellular phone or as a PC card (PCMCIA card) for easy operation in a notebook, a PC or a digital personal assistant (DPA) etc. It is essential here that the MT is capable of activating and operating the

transmission channels offered by the network (simply called "services" in mobile communication lingo) in parallel. On the network side, there is also the Intelligent Channel Access and Management Unit (ICAMU), which is shown in the figure as consisting of the functions TRAU and PCU, which augment the function of the Intelligent Channel Management Unit (ICMU). The ICAMU has the essential new function of the automatic allocation of the various application-optimized or data structure-oriented transmission channels of the air interface in preferably automatic collaboration with the CAC of the user (network operator-oriented, user-oriented, cost-oriented, resource-oriented, performance-oriented, quality-oriented, etc.) and to communicate this to the various networks (circuit-switched, packet-switched, etc.) This allocation will be done automatically within the application, to the extent possible, where there should be a possibility for optional manual control and the configuration in principle by the user. There should also be an option for manual control of the channel allocation process on the part of the network operator, with the possibility of allocating and optimizing the load dynamically among the various transmission channels of the air interface in order to reduce the channel capacity of the complete infrastructure, which will have the dimensions required for peak loads. If the network operator provides and prices certain functions only on a contract basis, a corresponding interface will be required between ICAMU and Customer Care and Billing System (CCBS).

[0029] In the present example, the ICAMU and the CAC collaborate to analyze the available multimedia data, the protocol descriptions, the service indicators, usage data etc., for the allocation and transmission via alternative air interfaces, to the extent that no dedicated channel allocation is desired. Furthermore, the ICAMU has the possibility of converting the protocol from Internet and multimedia protocols (on both sides), and the optional transmission of packet-oriented data (IP) via circuit-switched services (PSTN, ISDN or mobile terminated access), without requiring a detour via the Internet, as in GPRS, as well as alternatively the transmission of circuit-switched services via the air interface into the Internet.

[0030] Figure 2 shows again the transport pathways of multimedia data. The integrated multimedia data stream between user A and user B is interpreted in the components CAC and ICAMU by means of appropriate descriptors, indicators or by means of data analysis methods and the like, is separated into its transmission-oriented components, such as IP packet data, short messages, voice, and streaming video etc., is transmitted at the air interface by mobile radio communication transmission channels (ÜK1 – ÜK4), which are optimized to the application in question with regard to frequency and effort, and is re-aggregated at the receiving side to the original data stream. The parallel transmission is transparent to the user in this instance.

[0031] In an alternative realization, there is likewise a partial or complete transmission via parallel transmission in the ICAMU and the transmission to the various communication partners via various network accesses, or, if the communication partner or the respective telecommunication network has comparable features, the separate transmission of multimedia data to the same communication partner is possible (for example, an IP connection with integrated IP telephony, where the IP data are transmitted

via the internet and the voice transmission is automatically decoupled along the transmission path, is transmitted in parallel via circuit-switched telephone networks and is finally reassembled for the customer application). The alternative methods will of course include communication among users in the same mobile network.

[0032] The CAC is preferably implemented s a software driver, while the ICMU is normally a hardware apparatus, which could be adapted in flexible ways to the rapidly changing protocol world by means of software updates in its protocol, conversion and algorithm-specific components in micro processing or signal-processing technology. As an additional benefit, this combination could handle protocol modifications from IP to circuit switching and vice versa etc. for the user and could thus enable communication on various networks.

[0033] The description applies to any mobile network with internally optimized transmission procedures on, for example, the air interface for various applications (for example, for voice, burst, streaming and message applications and the like), using the example of the structure and nomenclature of the GSM mobile communications network. With adequate adaptations, the method of the invention may also be used in various mobile communications networks or, if necessary in fixed networks with similar problem sets.

List of Abbreviations

A	User
API	Application Programmable Interface
APS	Application Software
B	User
BSS	Base Station Subsystem (BTS, BSC)
CAC	Channel Access Client
CCBS	Customer Care and Billing System
GGSN	GPRS Gateway Support Node
GSSN	GPRS Switching Support Node
HLR	Home Location Register
ICAMU	Intelligent Channel Access and Management Unit
ICMU	Intelligent Channel Management Unit
ISDN	Integrated Services Digital Network
IWF	Interworking Function
MSC	Mobile Switching Center
MT	Mobile Terminal
MW	Multimedia Workplace
PC	Personal Computer
PCU	Packet Control Unit
PSTN	Private Switching Telecommunication Network
TA	Terminal Adapter
TRAU	Transcoder / Rate Adapter Unit
ÜK	Transmission Channel

[alternative specification of patent claims]

Patent Claims

1. A method for the optimized transmission of multimedia services in mobile communication networks, particularly mobile radio communication networks, where there is a data-structure specific separation and parallel transmission of the present data stream via the available transmission channels (ÜK1 to ÜK4) of the mobile communication networks, where the channels are optimized for the respective needs, and where a functional unit is used for the complete or partial separation of the data stream on the user side (CAC) as well as on the core network side (ICAMU), for example by allocation to the transmission base station,
characterized by having
having the functional unit (CAC) on the user's side as well as the functional unit (ICAMU) on the side of the core network equipped in such a way that they are capable of recognizing particular applications within the multimedia data streams, depending on their direction, by means of suitable parameters, such as indicators, descriptors, protocol variations, data analysis processes and the like and to separate them accordingly, to transmit them separately and to re-assemble them.

2. A method according to Claim 1, characterized by having a data-specific separation, which manages particularly to overcome the air interface for the purpose of optimal use of the frequency resources and to obtain optimal transmission quality of the specific application or the individual applications within a multimedia application.

3. A method according to claim 1 or 2, characterized by having the data stream that was separated according to data structure re-assembled after the optimized parallel transmission into the original data stream such that the optimization process covered by this invention is transparent to the user.

4. A method according to claim 1 or 2, characterized by having the option that at least some application-specific components of the data stream are not aggregated completely, but may be further transmitted at least in part as a separate data stream and may be transmitted on an optional basis within the mobile network or alternatively via various network accesses to other telecommunications or data networks to other receivers or, depending on the application, to the same receiver (single or multiple connection).

5. A method according to claims 1 to 4, characterized by having a functional unit (CAC) on the user's side as well as a functional unit (ICAMU) on the side of the core network, which are designed in their protocol, conversion, and algorithm-specific components preferably as software modules for microprocessors or signal processors in such a way that an update of partial functions as needed or alternatively the complete function via the mobile radio communications network is possible, which thus allows for a permanent method for updating to new methods and protocols.

ART 34 AMDT

6. A method according to claims 1 to 5, characterized by having an optional connection between the network functional unit (ICAMU) and the Customer Care and Billing System (CCBS) of the network operator for the billing of offered services and the creation and verification of the use of the methods covered by the invention by a single user.

7. A method according to claims 1 to 6, characterized by having the functional unit (CAC) on the user's side as well as the functional unit (ICAMU) on the side of the core network communicate with each other by means of appropriate methods, preferably by inband signaling, such that the needs of an optimized data transfer via various transmission channels between the component are met.

8. A method according to claims 1 to 7, characterized by having the functional unit (ICAMU) on the side of the core network provide an additional service to the user by optional conversion of the data stream from the user into other standardized multimedia or protocol forms and to transmit them through alternative pathways as needed.

9. A method according to claims 1 to 8, characterized by having at least the functional unit (ICAMU) on the side of the core network optionally equipped to handle appropriate routing and signaling mechanisms to transmit application or data structure specific parts of multimedia data streams via various transmission networks.

10. A method according to claims 1 to 9, characterized by the fact that the method described by the invention may be used in fixed network systems in like manner as needed.

11. A method according to claims 1 to 10, characterized by the fact that the method described by the invention may be used by appropriate action on the part of the network provider in allocating channels for the dynamic load distribution and load optimization of the alternative transmission channels and /or the various networks.

12. A method according to claims 1 to 11, characterized by the fact that the method described by the invention may be used by appropriate action on the part of the user (configuration menu or the like) for a customer-specific selection and choice method in as many areas as possible, such as speed of transmission, services used, priorities, quality of service, costs etc.

ART 34 AMDT

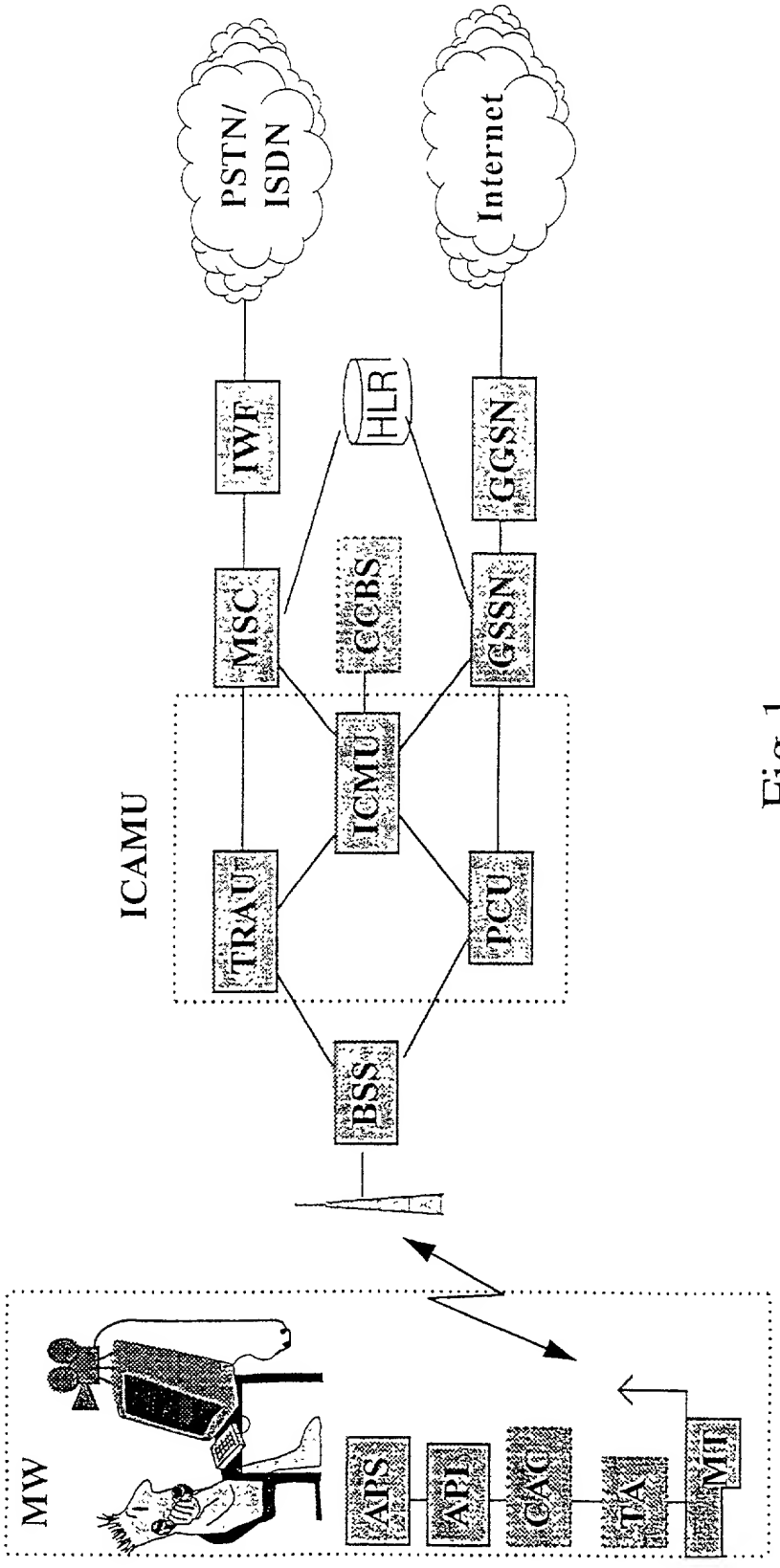

PSTN/
ISDN
Internet
IWF
HLR
GGSN
MSC
CCBS
GSSN
ICAMU
ICMU
TRAU
PCU
BSS
MW
ARS
APL
GAG
TAU
MII

Fig.1

2/3

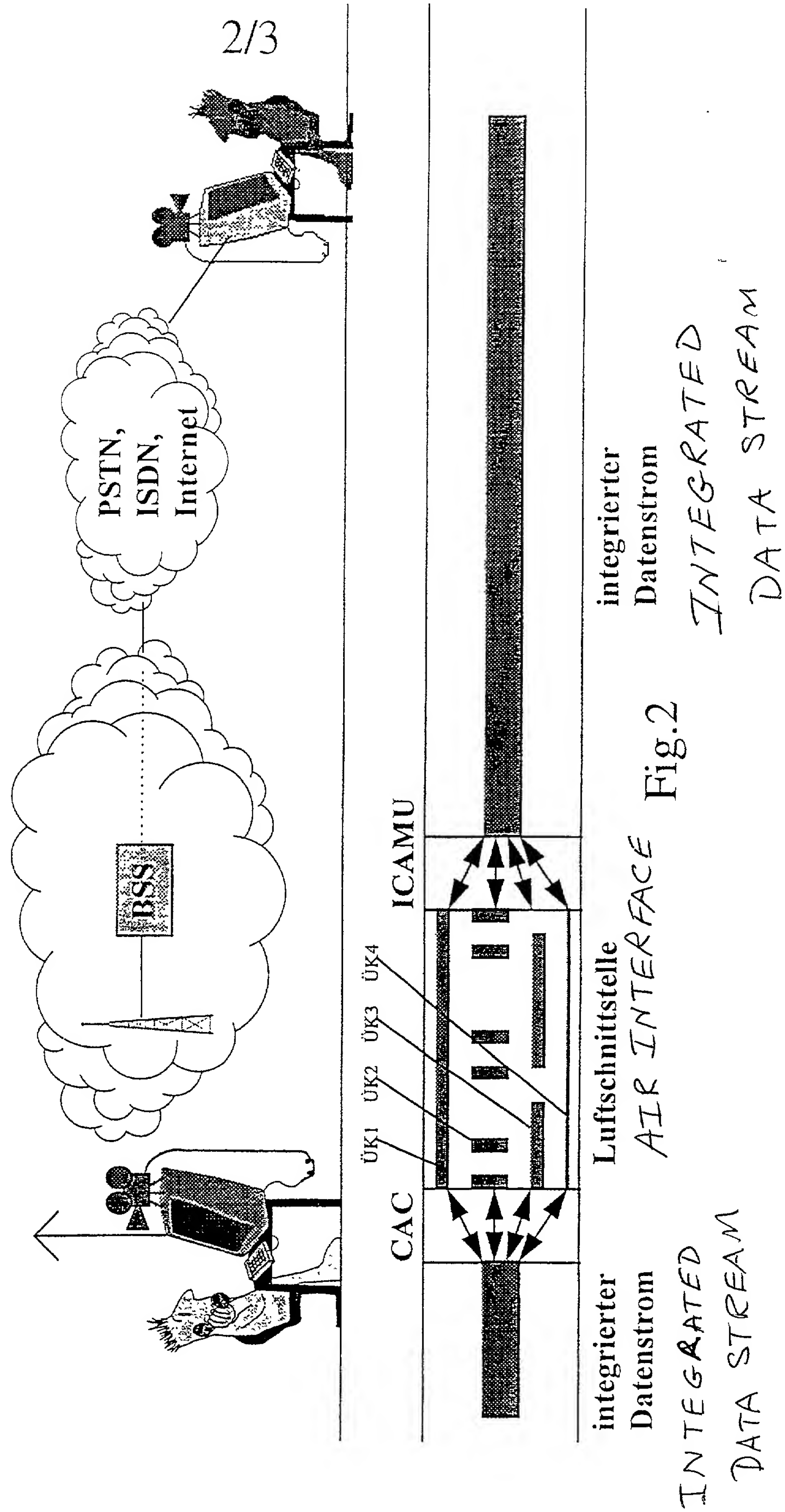

PSTN,
ISDN,
Internet
BSS
CAC
ICAMU
ÜK1
ÜK2
ÜK3
ÜK4
Luftschnittstelle
AIR INTERFACE
integrierter Datenstrom
INTEGRATED DATA STREAM
integrierter Datenstrom
INTEGRATED DATA STREAM

Fig.2

Stand der Technik

STATE OF THE ART

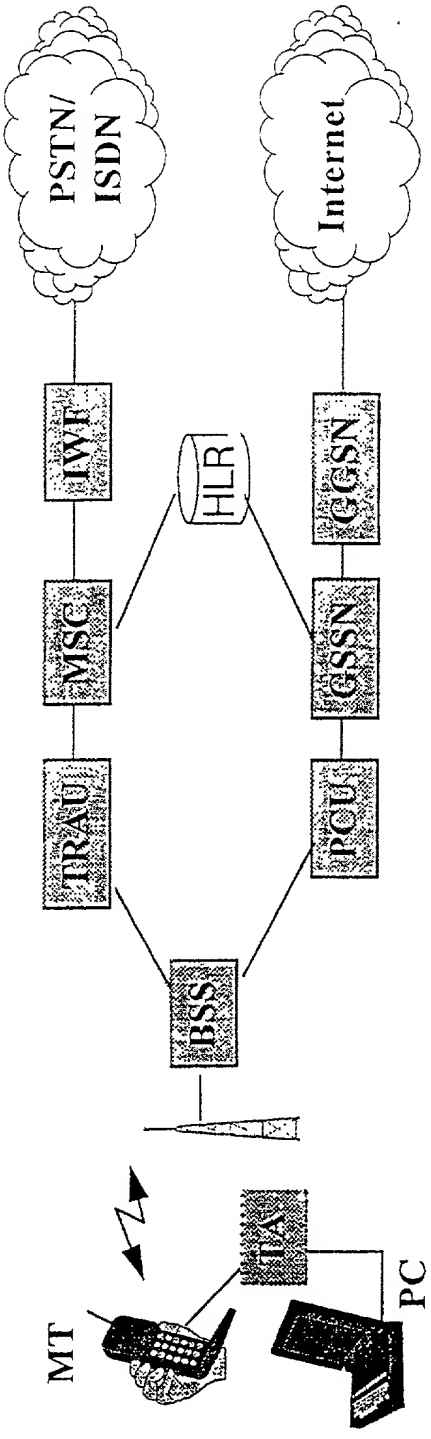


Fig.3

JC03 Rec'd PCT/PTO 26 APR 2001

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of Walter Keller Serial No.: 09/786,646 Filed: March 7, 2001 Title: METHOD FOR THE OPTIMIZED TRANSMISSION OF MULTIMEDIA SERVICES VIA MOBILE COMMUNICATIONS NETWORKS (MOBILE TELEPHONE NETWORKS)	Group: Examiner: International Application No. PCT/DE99/02843 Filed: Sept. 8, 1999

ATTENTION: APPLICATION PROCESSING DIVISION
SPECIAL PROCESSING AND CORRESPONDENCE BRANCH

SUBMISSION OF EXECUTED DECLARATION

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

In response to the Notification of Missing Requirements mailed April 11, 2001, enclosed herewith is the signed and dated Declaration in the above-identified application together with a copy of Form PTO/DO/EO/905.

Submitted herewith is a check in the amount of $130.00, to cover the late Declaration surcharge. If the enclosed remittance is insufficient, the Commissioner is authorized to charge payment of the following fees during pendency of this application or credit any overpayment to Deposit Account No. 02-0385 BAKER & DANIELS:

1. Any additional fees required under 37 CFR 1.16.
2. Any patent application processing fees under 37 CFR 1.17
3. Any filing fees under 37 CFR 1.16 for presentation of extra claims

It is submitted that with the filing of the above documents, the application is complete and may be submitted for examination by the Patent and Trademark Office.

Respectfully submitted,

05/01/2001 LLANDGRA 00000054 09786646
01 FC:154 130.00 OP

John F. Hoffman
Registration No. 26,280
Attorney for Applicants

JFH/pmp

BAKER & DANIELS
111 EAST WAYNE STREET, SUITE 800
FORT WAYNE, IN 46802
TELEPHONE: 219-424-8000
FACSIMILE: 219-460-1700

Enc.
Declaration
Form PTO/DO/EO/905
Return Postcard

"EXPRESS MAIL" MAILING LABEL NUMBER EL731283898US
DATE OF DEPOSIT April 26, 2001

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, DC 20231.

Patrice Michele Potter
(Typed Name of Person Mailing Paper or Fee)

Patrice Michele Potter
(Signature of Person Mailing Paper or Fee)

PTO/SB/103 (8-96)
Approved for use through 9/30/98. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Declaration and Power of Attorney for Patent Application
Erklärung für Patentanmeldungen mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

daß mein Wohnsitz, meine Postanschrift und meine Staatsangehörigkeit den im nachstehenden nach meinem Namen aufgeführten Angaben entsprechen, daß ich nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent für die Erfindung mit folgendem Titel beantragt wird:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD FOR THE OPTIMIZED TRANSMISSION OF MULTIMEDIA SERVICES VIA MOBILE COMMUNICATIONS NETWORKS (MOBILE TELEPHONE NETWORKS)

deren Beschreibung hier beigefügt ist, es sei denn (in diesem Falle Zutreffendes bitte ankreuzen), diese Erfindung

the specification of which is attached hereto unless the following box is checked:

☐ wurde angemeldet am _____ unter der US-Anmeldenummer oder unter der Internationalen Anmeldenummer im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesens (PCT) _____ und am _____ abgeändert (falls zutreffend).

☒ was filed on September 8, 1999 as United States Application Number or PCT International Application Number PCT/DE99/02843 and was amended on _____ (if applicable).

Ich bestätige hiermit, daß ich den Inhalt der oben angegebenen Patentanmeldung, einschließlich der Ansprüche, die eventuell durch einen oben erwähnten Zusatzantrag abgeändert wurde, durchgesehen und verstanden habe.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Titel 37, Code of Federal Regulations, § 1.56 von Belang sind.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

Burden Hour Statement: This form is estimated to take 0.4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

PTO/SB/103 (8-96)
Approved for use through 9/30/98. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

German Language Declaration

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäß Title 35, US-Code, § 119 (a)-(d), bzw. § 365(b) aller unten aufgeführten Auslandsanmeldungen für Patente oder Erfinderurkunden, oder §365(a) aller PCT internationalen Anmeldungen, welche wenigstens ein Land ausser den Vereinigten Staaten von Amerika benennen, und habe nachstehend durch ankreuzen sämtliche Auslands- anmeldungen für Patente bzw. Erfinderurkunden oder PCT internationale Anmeldungen angegeben, deren Anmeldetag dem der Anmeldung, für welche Priorität beansprucht wird, vorangeht.

I hereby claim foreign priority under Title 35, United States Code, §119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Applications
(Frühere ausländische Anmeldungen)

(Number) (Nummer)	(Country) (Land)	(Day/Month/Year Filed) (Tag/Monat/Jahr der Anmeldung)	Priority Not Claimed Priorität nicht beansprucht
198 41 531.1	Germany	10 September 1998	☐
			☐

Ich beanspruche hiermit Prioritätsvorteile unter Title 35, US-Code, § 119(e) aller US-Hilfsanmeldungen wie unten aufgezählt.

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

(Application No.) (Aktenzeichen)	(Filing Date) (Anmeldetag)

Ich beanspruche hiermit die mir unter Title 35, US-Code, § 120 zustehenden Vorteile aller unten aufgeführten US-Patentanmeldungen bzw. § 365(c) aller PCT internationalen Anmeldungen, welche die Vereinigten Staaten von Amerika benennen, und erkenne, insofern der Gegenstand eines jeden früheren Anspruchs dieser Patentanmeldung nicht in einer US-Patentanmeldung, bzw. PCT internationalen Anmeldung in in einer gemäß dem ersten Absatz von Title 35, US-Code, § 112 vorgeschriebenen Art und Weise offenbart wurde, meine Pflicht zur Offenbarung jeglicher Informationen an, die zur Prüfung der Patentfähigkeit in Einklang mit Title 37, Code of Federal Regulations, § 1.56 von Belang sind und die im Zeitraum zwischen dem Anmeldetag der früheren Patentanmeldung und dem nationalen oder im Rahmen des Vertrags über die Zusammenarbeit auf dem Gebiet des Patentwesen (PCT) gültigen internationalen Anmeldetags bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application No.) (Aktenzeichen)	(Filing Date) (Anmeldetag)	(Status) (patented, pending, abandoned) (Status) (patentiert, schwebend, aufgegeben)
PCt/DE99/0284	08/09/99	Published

Ich erkläre hiermit, daß alle in der vorliegenden Erklärung von mir gemachten Angaben nach bestem Wissen und Gewissen der Wahrheit entsprechen, und ferner daß ich diese eidesstattliche Erklärung in Kenntnis dessen ablege, daß wissentlich und vorsätzlich falsche Angaben oder dergleichen gemäß § 1001, Title 18 des US-Code strafbar sind und mit Geldstrafe und/oder Gefängnis bestraft werden können und daß derartige wissentlich und vorsätzlich falsche Angaben die Rechtswirksamkeit der vorliegenden Patentanmeldung oder eines aufgrund deren erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLMACHT: Als benannter Erfinder beauftrage ich hiermit den (die) nachstehend aufgeführten Patentanwalt (Patentanwälte) und/oder Vertreter mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Angelegenheiten vor dem US-Patent-und Markenamt: *(Name(n) und Registrationsnummer(n) auflisten)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: *(list name and registration number)*

Postanschrift:

Telefonische Auskünfte: *(Name und Telefonnummer)*

Send Correspondence to:

John F. Hoffman, BAKER & DANIELS

Direct Telephone Calls to: *(name and telephone number)*

John F. Hoffman
219-424-8000

Vor- und Zuname des einzigen oder ersten Erfinders	Full name of sole or first inventor Walter Keller
Unterschrift des Erfinders Datum	Inventor's signature Date 2003.07
Wohnsitz	Residence Ratingen, Germany DEX
Staatsangehörigkeit	Citizenship German
Postanschrift	Post Office Address Dumpelstrasse 15 D-40880 Ratingen GERMANY
Vor- und Zuname des zweiten Miterfinders (falls zutreffend)	Full name of second joint inventor, if any
Unterschrift des zweiten Erfinders Datum	Second Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Im Falle dritter und weiterer Miterfinder Miterfinder sind die entsprechenden Informationen und Unterschriften hinzuzufügen.)

(Supply similar information and signature for third and subsequent joint inventors.)